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A. A. BRENEMAN, 97 Water St., New York.

ON A PHOTOGRAPHIC PROCESS BY MEANS OF ANILINE BLACK.

By H. Endemann, Ph. D.

About five years ago I devised a process for the production of positives directly, based upon the production of aniline black in all those parts of a prepared paper which do not receive the light by reason of being shaded by dark portions of a drawing. The process can be used not only for the production of line pictures but is also applicable to the production of pictures which are obtained by a photographic process, i. e., it will produce not only shaded line pictures but also half-shades. As my attention had been drawn to this as a matter of importance I intended to make some experiments in this direction, when I came across some copies of pictures which had been taken about the time when I first produced copies by means of this process and where the originals had been shaded by means of a brush with India ink. These copies confirmed the belief that shades can be reproduced by this process.

I will confine myself here mainly to the description of the process from a chemical point of view, since I have sent to the *Scientific American* during August of this year a detailed description of the manipulations, without, however, touching the chemical questions involved in the process, and describe here the process only in so far as it is necessary for a better understanding.

The paper which is used for this process must be well sized with glue. I found even with the best writing papers too little resistance to the penetrating properties of the acid, sensitive solution, and found it, therefore, invariably best to prepare the paper by covering it with a solution of glue in water (1:50). After the paper has been thus prepared and has again become dry, it is ready to receive the sensitive mixture or solution.

This solution is prepared as follows: one ounce of salt, one

ounce of potassium bichromate, and $\frac{2}{3}$ grains of sodium vanadinate are dissolved in 20 ounces of water. Then a second solution is prepared by pouring 2 ounces of sulphuric acid into 10 ounces of water. After the second solution has cooled both solutions are mixed. This solution is then brought upon the paper, and the paper is dried in a dark room.

The dry paper, or the paper when still slightly damp, is then exposed to light for about 7 minutes, covered with the drawing or picture which is to be copied, in an ordinary copying frame. To ascertain the time which is required for a good copy more accurately, I take a piece of the same paper on which the drawing is and place it over another small piece of the sensitized paper so as to cover it partly, and observe when the shade of the covered part of the paper has become equal to the shade of the fully exposed paper. The influence of insufficient light and of the light-absorbing qualities of the paper are thus overcome.

When this point has been reached, that is, when the covered part of the paper has taken the same shade of color as the uncovered part, the picture is removed from the light and put in the dark until the next process, that of developing the picture, is to be carried out.

From the composition of the solution it is evident that it must be strongly acid. But when this solution is exposed to the light in presence of the organic substances of the paper the acidity of the solution disappears. We obtain potassium and sodium sulphates, basic chromium sulphate, salt and vanadic acid.

While, therefore, the unchanged parts of the paper remain acid, the changed parts acquire a neutral reaction, and while the first will readily assimilate bases the second will not.

If now we expose the paper over an atmosphere laden with water and aniline vapors, the aniline will be absorbed in all those parts where the solution remained acid, and in proportions corresponding to the remaining acidity. The aniline and water (1:50) contained in a flat pan are slightly heated by a Bunsen burner, and the paper on which the picture is to be developed is spread over the opening in a frame placed tightly upon the pan.

One minute's exposure develops the picture so that the color of

lines, etc., appears slightly brown. The paper is then, for the further development of the color, brought into a closet with a temperature of about 24–30° C. and an atmosphere laden with vapors of water, to prevent a drying out of the paper. In the course of about two hours the color is generally sufficiently strong and the picture or copy may be considered finished beyond the fact that the paper itself has been coated with green chromium salt so that the picture is one of black lines upon a green surface. To remove the chromium and to restore the original white of the paper, the copies are then brought into a solution of one part of concentrated ammonia in six parts of water. They are then washed, dried and pressed. The conditions for the development of aniline black are the same as are usually employed if the process is carried out as described. None of the salts given as constituting the sensitive mixtures can be left out. The chromate is necessary for the change of the reaction, the hydrochloric acid of the salt and vanadic acid for the development of the aniline black. The conditions for the development of the black at low temperature require, however, that we must not oversaturate the acids with aniline, for then the formation of the black would be considerably interfered with. For the same reason fine shades in photographic positives may disappear in the copy entirely. I believe, therefore, that the real usefulness of the process lays rather in the reproduction of line drawings in place of the blue print processes now in general use.

The advantage of this process lies in the fact that the lines are almost black, and therefore more distinct to the eye than the blue lines upon white, or the white lines upon blue in the ordinary blue prints.

ON THE EFFICIENCY OF FREDERICK BREYER'S "MICRO-MEMBRANE FILTER."

By James H. Stebbins, Jr.

The essential part of the micro-membrane filter is a membrane composed of minute asbestus fibres, supported by a hollow metal grate. The filter is now so arranged that the membranes can be renewed at pleasure, whereas formerly they could only be produced upon the metal grate itself.

The best kind of asbestus to use for the manufacture of these membranes, is that which when split up and disintegrated, yields a wooly, silky and loose material. For the purpose of constructing these membranes the asbestus wool is ground in a mill, until the length of its fibers is reduced to such an extent that the longest ones are not more than 5–7 m. m., while the shortest ones measure far less than 1 m. m. in length.

This short asbestus wool is soaked in water for several days, and then mixed in about equal parts by weight with crystalline calcium carbonate, and put into a mill of peculiar construction, where the wet pulp is ground together with the crystalline calcium carbonate, the grains of which are about the size of peas. The grinding is kept up until the material has been reduced to the required degree of fineness. By observing the ground product, greatly diluted with water, in a test tube, the requisite degree of fineness may be determined. The ground product is now treated with sufficient dilute hydrochloric acid to dissolve the calcium carbonate, and, after being well stirred, it is allowed to stand for a day or two in this state, after which the calcium chloride is washed out in a common rag mill. After the washing there remains a loose, exceedingly fine, almost chemically pure asbestus emulsion.

The asbestus fibers on being ground up with the calcium carbonate are acted upon by the sharp edges of the latter, which, penetrating between the asbestus fibers wedge fashion, splits them up into innumerable individual fibers, just as wood is split with the ax. The minute crystals of the carbonate on the other hand, remaining after the splitting process is completed, would be prejudicial to a dense and uniform filtering tissue if not removed, but on being subsequently brought in contact with the dilute hydrochloric acid

CO_2 is given off, which disintegrates and resolves the chaos of filaments into infinitesimal particles.

The extreme minuteness of these asbestus fibers is such, that with Reichert's best lenses the inventor was unable to measure them, but estimates the larger ones to be about $\frac{1}{10000}$ millimeter in diameter, and the smaller ones to be invisible.

Now, if we imagine three such layers, one above the other, we shall obtain (if the membrane is $\frac{5}{10000}$ m. m. in thickness) about 2,500,000 pores per square m. m. It may then be assumed that one square millimeter of "micro-membrane" contains $2\frac{1}{4}$ millions pores. It is therefore not likely that a fibrous asbestus material, equal to the one described, could be produced as advantageously in any other manner. The crystalline calcium carbonate is just hard enough to effect the separation of the asbestus fibers without diminishing their length. The finely divided asbestus, prepared as just described, is called by the inventor for the sake of brevity "microfibrin."

With it he produces a membrane obtained by depositing the microfibrin, suspended in water, upon mosquito netting in a manner similar to that employed in paper making. When dry the membrane is so strong that it can be handled like paper. Asbestus membranes cannot of course be produced in exactly the same way as that adopted in the manufacture of paper, because by that means it would be impossible to obtain that perfect uniformity in the stratification of the fine fibers, which is actually the case and which is absolutely necessary for the separation of micro-organisms.

The membranes are made in the following manner:

Into a large wooden box is inserted a double wooden frame, called the "stretching frame." The inner frame is permanently covered with wire gauze, which serves to support the mosquito netting, and is firmly stretched by the outer frame, which presses it down by means of a rubber packing. After the frame has been placed in position, the box is filled two-thirds full with water, in which the microfibrin has been suspended. All the suspended asbestus is now precipitated upon the mosquito netting, in consequence of the water flowing off through a pipe at the bottom of the box.

The coarser and heavier fibers are deposited first, on account of their weight, and subsequently the finer ones. The uniformity in

the distribution of the fibers is due to the fact, that in the places where the fibers have been deposited more densely, the speed of the percolating water is diminished, so that less of the asbestus is able to accumulate in such places. In those places, however, where the layer of asbestus is very thin, the speed of the percolating water is greater, consequently a corresponding quantity of asbestus will be precipitated upon these spots. Thus with mathematical regularity, the speed of the flowing water equalizes the deposit of asbestus fibers over the entire surface. After the desired thickness of asbestus has thus been deposited, the frames are removed from the box, and the membrane dried in an oven at 150° C., after which it is peeled off, along with the netting from the wire gauze and cut into pieces of the desired size.

Without going into any great detail, I would state that the micromembranes are mounted with shellac, or a solution of sealing wax in alcohol, on nickel plated hollow brass frames of peculiar construction (usually two micromembranes per frame being employed), and placed vertically in nickel plated brass cylinders, or vessels, where they are held in position by suitable means.

If, after the filter is set up and in working order, it be charged with water, the latter should not, if the filter is in good order, begin to percolate through the micromembranes for at least 5–8 minutes after charging. If, on the other hand, the micromembrane is imperfect the water will come through much sooner than this. If such be the case the frame holding the micromembrane must be removed from the filtering vessel and carefully examined. If the leak is found to be caused by an imperfect cementing of the micromembrane to the brass frame, this can be easily remedied by applying another coat of sealing wax cement to the edges of the micromembrane; but if, on the contrary, it should be found that the micromembrane itself is imperfect, then the simplest thing to do is to remove the imperfect or injured membrane and replace it by a fresh one.

Everything being now in order, the flow of water through the filter will depend of course greatly upon the size of the filter, and the nature of the water being filtered. Water containing much matter in suspension will naturally clog up the filter much sooner than one containing less matter in suspension; but, owing to the

peculiar construction of these filters they will be found to render service long after an ordinary filter has become clogged and useless, for, whereas in most of the ordinary filters the water passes vertically through them, in the micromembrane filters it is caused to pass laterally through them so that a large part of the matter in suspension will settle to the bottom of the filtering vessel and only a part of it will adhere to the micromembranes, thereby greatly prolonging their efficiency. After the micromembranes have become thoroughly clogged, through long use, they may easily be removed and replaced by fresh ones.

The filters used in these experiments consisted of a pocket filter and a stationary filter for household use. The former one was used to determine the quantity of water it was capable of filtering in a given time and the length of time it would run without clogging. The latter was used for biological purposes to determine whether (as claimed by the inventor) it was capable of freeing water of microbes by retaining them upon the micromembranes. I was at first rather undecided whether in the first case I should use water in which a very fine precipitate had been suspended, or, in the second case, a sterilized water which had been planted with microbes either from sewage or an aqueous extract of garden soil. I finally decided to use nothing but Croton water, as it would be a good test of the efficiency of the filters, inasmuch as it is a water in everyday use.

FILTERING EFFICIENCY OF THE POCKET FILTER.

The micromembranes in this filter were square, size $4''\frac{5}{8}$ x $4''\frac{5}{8}$. About eight minutes after immersing this filter in water, it was supplying water at the rate of 96 c.c. per minute or 5760 c.c. per hour, equivalent to $1\frac{1}{2}$ galls. per hour or 36 galls. per 24 hours.

From April 28th to May 18th it had worked 20 days of the average length of 7 hours, and at the end of that time it was still working pretty well, supplying water at the rate of 4.9 galls. per 24 hours. I consider these results remarkably good, and think it safe to say that if the filter will work 20 days without clogging, being in nearly constant use, it ought to run at least two months when only used occasionally. In such a case the water in the filter can be poured out and the membranes allowed to dry. The micro-

membranes, after these 20 days' usage, were found covered with a brown slimy mass, which was probably the cause of their decrease in filtering power.

BIOLOGICAL EXPERIMENTS.

The object of these experiments I have already stated. Tests of this kind are really the severest that can be made, as it is hard to imagine anything much smaller than some (especially the pathogenic forms) of microbes. My experiments were conducted in the following manner:

1 c.c. of unfiltered Croton water was added to 7 c.c. of sterilized gelatine-culture medium contained in a test tube, thoroughly mixed, and then poured rapidly upon a sterilized glass plate, covered over with a glass shade, and in order to prevent the internal atmosphere of the shade from being contaminated from without, it was protected by a seal consisting of a 2% solution of corrosive sublimate.

The plates thus prepared were placed in the incubator, heated to 25° C. and allowed to incubate for two days. At the end of this time the plates were removed and the microbes counted. In the same manner plates planted with 1 c.c. of filtered Croton water were prepared and examined. By subtracting the number of organisms found in the filtered water from those found in the unfiltered water we obtain the reduction, *i. e.*, the number of organisms that were retained on the micromembranes, or in other words, the efficiency of the filter.

Initial efficiency or first day:

Unfiltered water	Organisms too numerous to count.
Filtered water	0
Reduction	100 %

Efficiency after three days' filtration:

Unfiltered water	3840 organisms per c.c.
Filtered	7
Reduction	3833
Eq. to	99.8 %

Efficiency after ten days' filtration:

Unfiltered water	4032 organisms per c.c.
Filtered water	8
Reduction	4024
Eq. to	99.8 %

SUMMARY.

From the foregoing experiments it will be seen, first, that these filters are capable of yielding a good supply of water and will run for a long while without clogging, and second, that the water filtered through them is practically free from micro-organisms, which is a point of great importance.

ABSTRACTS.

GENERAL AND INORGANIC CHEMISTRY.

Heat of the Alloys of Lead and Tin. W. SPRING.

The author thought that by studying the specific heat of these alloys within limits of temperature, and comparing the results with the heat of their constituents some light would be thrown upon the constitution of the alloys. Eleven alloys were examined, viz.:

$Pb\,Sn$; $Pb_2\,Sn$; $Pb_3\,Sn$; $Pb_4\,Sn$; $Pb_5\,Sn$; $Pb_6\,Sn$; $Pb\,Sn_2$; $Pb\,Sn_3$; $Pb\,Sn_4$; $Pb\,Sn_5$; $Pb\,Sn_6$.

The specific heat was measured from 360° to 100°., and from 10° to 10°.

The mean specific heat of lead was found from 16° to 292°$_2$ to be $C_{Pb}=0.02761+0.00002086\,t+0.00000001746_{t_2}$. For tin from 20° to 197° it was found to be $C_{Sn}=0.05032+0.00003646_t+0.00000006343_{t_2}$.

The author finds that the heat observed is considerably above the heat calculated, and that the specific heat of the alloys is equal to the mean specific heat of their constituents. This shows

that the liquid alloys behave like simple mechanical mixtures. From a certain temperature there is produced in the mass still solid a molecular work that has the effect of simplifying the molecules of the constituents, although producing new molecules, including molecules of each metal. This effect is produced slowly at first, but increases to a maximum; at that the temperature remains stationary and the alloy melts. Soon the molecular work becomes slower, the temperature increases, and the simplification of the molecules ceases. Finally, at a certain temperature, varying for each alloy, all molecular simplification ceases.

In the cooling of the alloy the same phenomena occur, but in the reverse order. (*Bul. Soc. Chim.*, **46**, *255.*) M. L.

Reaction between the Ferric Salts and Oxalic Acid under the Influence of Heat. G. LEMOINE.

The author has found that ferric chloride and oxalic acid in aqueous solution are mutually decomposed by heat in the dark.

$$Fe_2Cl_3 + C_2O_3HO = Fe_2Cl_2 + HCl + C_2O_4.$$

With the nitrate of iron the decomposition is similar, but more complicated, as nitric oxide is evolved in addition to carbon dioxide.

$$3(Fe_2O_3 3NO_5) + 3(C_2O_3HO) = 3C_2O_4 + NO_2 + 3(Fe_2O_3, 2NO_5 . HO).\ *$$

The author has studied the influence of temperature upon the reaction; above 50° it is accelerated by the increase of heat, being null at 50°; the speed of the reaction at 100° becomes less with time. P being equivalent quantities of the reagent, t the time, y the amount already decomposed at the end of t, the formula becomes

$$\frac{dy}{dt} = (p - y)\ K;\ \log\left(1 - \frac{y}{P}\right) = -ct.$$

Dilution, instead of making the reaction slower, as it should if the water exerted no chemical action, increases the rapidity of the reaction; an excess of water decomposing ferric chloride the oxalic

* O = 8.

acid exerts its action more readily. An excess of the ferric reagent has no effect; but the increase of oxalic acid in solution is marked by an increase in the activity of the decomposition for an amount of oxalic acid answering to a ferric dioxalate. For a greater excess of reagent, the addition is marked by a decrease in the activity of the reaction. The author had in view the comparing of the effects of heat with those of light already described. (*Comptes. Rend., 1883, 2d semestre.*) (*Bul. Soc. Chim.*, **46,** *289.*) M. L.

Preparation of a Calcium Sulphide with Violet Phosphorescence. A. VERNUEIL.

The author has remarked that the special violet phosphorescence of the so-called Canton's phosphorous is due to a trace of a bismuth sulphide. He describes the preparation of this substance as follows: 20 grms. of lime from the calcinations of a dense calcareous matter, the shell of *Hypopus vulgaris*, for example, are finely pulverized and mixed with 6 grms. of sulphur and 2 of starch. The mixture is incorporated with 8 c.c. of a solution of 0.050 bismuth subnitrate, 100 of alcohol and a few drops of HCl. After evaporation of the alcohol the mixture is heated for 20 minutes in a covered crucible at a bright cherry red. The product, pulverized again, is heated a second time for 15 minutes. Chemically pure calcium sulphide is not phosphorescent. (*Bul. Soc. Chim.*, **46,** *302.*)

M. L.

Combinations of Hydrogen Phosphide with Chloral Hydrate. J. DE GIRARD.

Eight grms. PH_4I are dissolved in a solution of 16 grms. of chloral hydrate in 14 grms. of ether. By evaporation, a crystalline body melting at 117–119° is obtained. These crystals lose water and are transformed into dichloralphosphine $[P(Cl_3—CHOH)_2]_2 + H_2O$, melting at 142°. This body is insoluble in water. Hydrate of butylchloral gives, under the same conditions, a non-crystallizable body. With acetyl chloride the hydrate of dichloralphosphine gives crystals of $[P(CCl_3—CHOCO_2—CH_3)]_2 + H_2O$. Dichloralphosphine acts also on propionic anhydride. (*Comptes. Rend., 102–113.*) M. L.

Volumetric Separation of Tin and Antimony. H. GIRAUD.

In presence of a large quantity of HCl antimonic chloride sets free I from HI according to the formula

$$SbCl_5 + 2HI = 2HCl + SbCl_3 + 2I.$$

Stannic chloride does not produce this reaction.

The two metals being separated from other metals are treated with HCl and $KClO_3$. A portion of the solution is treated with KI and HCl; the liquid is then treated by CS_2, which removes free iodine. The solution is then titrated by sodium hyphosulphite. Two atoms of I correspond to one atom of antimony. (*Bul. Soc. Chim.*, **46**, *504.*) M. L.

Standardizing Iodine Solutions. W. KALMAN.

A measured volume of the solution of iodine is treated with H_2S until decolorized and the hydriodic acid titrated with $\frac{n}{10}$ Na OH, methyl orange being used as an indicator. Advantages are claimed over the usual method. (*Ber. d. Chem. Gesell*, **19**, *728.*) R. W. M.

ORGANIC CHEMISTRY.

Action of Heat on Acetones. P. BARBIER & L. ROUX.

From the mode of formation of these bodies they seem to present a great resistance to heat. The authors have studied the influence of high temperature upon and the laws governing the decomposition of the following acetones, viz.:

1. Dimethylcarbonyl $(CH_3)_2 = CO$; 2. Benzophenone $(C_6H_5)_2 = CO$; 3. Acetophenone $C_6H_5 . CH_3 . CO$.

The vapors were passed into a copper tube, 1 metre long and heated to about 1000°; the gases and other products were collected.

1. Dimethylcarbonyl. The action of heat yields a tarry body containing naphthaline and a great deal of gas, without formation of water.

$$2\,[(CH_3)_2 = CO] = 2\,CO + 2\,CH_4 + C_2H_4$$

The hydrogen obtained comes from a secondary reaction.

$$n\ C_2H_4 = (C_2H_2)n + n\ H_2$$

2. Benzophenone. The tarry bodies obtained yielded benzol boiling at 80°–85°; diphenyl boiling at 250°, melting at 75°; a great deal of undecomposed benzophenone; paradiphenylbenzol boiling at 400°, and melting at about 205°; rosin-like products boiling above 450°.

The gases are of carbonic oxide and hydrogen.

$$2\ [(C_6H_5)_2 = CO] = 2\ CO + C_6H_6 + (C_6H_5)_2C_6 + H_4$$

3. Acetophenone. This acetone, which includes a methylic and a phenylic groups gives the products of each group notwithstanding that some toluol is yielded.

The tarry products are formed of: Benzol boiling at 80–85°; a small amount of toluol; some undecomposed acetophenone; diphenyl melting at 70°; paradiphenyl benzol melting at 205°, and a small quantity of a rosin-like body.

The conclusion is that a red heat determines the separation of the carbonyl group intact and that the hydrocarbon groups are copulated or are decomposed into the usual products of their decomposition by heat. (*Bul. Soc. Chim.*, **46**, *268.*) M. L.

Reactions of the Aqueous Solution of Dipropylamine with Metallic Salts. C. VINCENT.

The metals in general are precipitated. The following are the results: Magnesium, in neutral or acid solutions, white, insol. in exc.; glycinium, white, insol. in exc.; aluminium, white, sol. in exc.; zirconium, white, insol. in exc.; iron (minimum), greenish, insol. in exc.; iron (maximum), ochre like, insol. in exc.; chrome (sesquioxide), green, hydrate, insol. in exc.; manganese, in neutral or acid solutions, white, insol., coloring rapidly in the air; cobalt, blue, insol. in exc.; nickel, apple green, insol. in exc.; uranium, (sesquioxide), yellow, insol. in exc.; zinc, white, insol. in exc.; cadmium, white, insol. in exc.; tin (protoxide), white, insol. in exc.; tin (bioxide), white, sol. in exc.; antimony (minimum), white, insol. in exc.; antimony (maximum), white, insol. in exc.; bismuth, white, insol. in exc.; lead, white, insol. in exc.; copper (maximum),

light blue, insol. in exc.; mercury (minimum), black, insol. in exc.; mercury (maximum), yellowish, of a sub-salt, then bright yellow with exc.; mercury (bichloride), white, sol. in exc., then immediately bright yellow; silver, gray, very sol. in exc. (silver chloride is slightly soluble in the alkaline reagent); palladium (minimum), chamois color, insol. in exc.; gold, light yellow, quickly becoming dark violet blue, with slight exc., then dissolving in larger exc. to yellow solution; platinum, no precipitate. (*Bul. Soc. Chim.*, **46**, *287.*) M. L.

On Few Immediate Principles of the Bitter Orange. C. TANRET.

The author treats the orange peel with alcohol at 60°; evaporates the alcohol, and treats the residue with chloroform. The chloroform solutions and the portion insoluble in chloroform yield, after suitable treatment, the following bodies:

1. Hesperic acid, soluble in chloroform, sparingly soluble in cold alcohol, giving with Na_2O, K_2O and CO uncrystallizable salts. It does not combine with NH_3. Its composition is $C_{44}H_{28}O_{14}$.

2. An uncrystallizable acid, called by the author "aurantiamaric," insoluble in cold water, seemingly a product of decomposition of hesperidine. The formula is $C_{20}H_{12}O_8$.

3. An uncrystallizable, acid, rosin-like body, very bitter.

4. A glucoside, slightly bitter, which, after dehydratation, has the composition of hesperidine, but somewhat different properties. Compositions, $C_{44}H_{26}O_{24}$, $5H_2O_2$.

5. A bitter glucoside soluble in water and alcohol, insoluble in ether and chloroform. It is uncrystallizable and has nearly the same composition as hesperidine.

6. Hesperidine. This glucoside has already been described by Tieman and Will. (*Bul. Soc. Chim.*, **46**, *500.*) M. L.

Constitution of the Nitro-Compounds of the Fatty Series. P. ALEXEYEFF.

According to Kissel, nitroethane is acetohydroamic acid (CH_3 CO) HN. OH.

The author, who had at first accepted this view, now thinks that nitroethane must be regarded as an isonitrosoethyl alcohol.

$$CH_3.\ C\begin{cases}OH\\ N\text{-}OH\end{cases}$$

Its formation can be explained as follows:

$$CH_2.\ CH_2\ I + NO.\ OAg = CH_3.\ C\begin{cases}I\\ N.OAg\end{cases} + H_2O$$

$$CH_3.\ C\begin{cases}I\\ N.\ O\ Ag\end{cases} + H_2O = CH_3C.\begin{cases}OH\\ N.OH\end{cases} + Ag\ I$$

(*Bul. Soc. Chim.*, **46**, *266.*) M. L.

A Physical Property of α-triphenylguanidine. H. GIRAUD.

This body, prepared from diphenylsulphourea and aniline, melts at 143°, and remains in surfusion. If, while melted, it is cooled rapidly the viscidity increases, and in time the substance becomes solid without appearance of crystallization. This solid body, heated slowly, becomes soft, melts without having a definite melting point, and finally passes to the crystalline state. This transformation is instantaneous at 160°. On contact with a liquid it becomes opaque and falls into powder. The better the solvent employed the more sudden the action. (*Bul. Soc. Chim.*, **46**, *506.*) M. L.

Transformations Produced in Suint Waters. A. BUISINE.

The quantity of carbonate of potash in these waters varies with the age and the concentrations of the liquids. The author attributes these changes to the work of living organisms. The fatty acids eliminated by the sheep are not present as potassium salts, but as more complex forms that are destroyed by the action of the ferment. If the waters are concentrated the fermentation stops at the formation of volatile fatty acids, under the influence of an anaerobic ferment; but if the solution is dilute and in the contact with air an aerobic ferment operates and the chemical action is more energetic, the fatty acids being converted into water and CO_2. (*Bul. Soc. Chim.*, **46**, *497.*) M. L.

Investigations on the Composition of Carotin, its Chemical Nature and Formula. A. ARNAUD.

Carotin oxidizes in the air, especially when in solution. Fresh carotin is free from oxygen and forms an iodine salt, $C_{26}H_{38}I_2$. Its formula is $C_{26}H_{38}$. It crystallizes in rhombic prisms with metallic lustre, appearing blue by reflected light and orange red by transmitted light. It gives a blue color with sulphuric acid. Huseman's carotin was an oxidation product. (*Comptes. Rend.*, **102**, *1119.*) R. W. M.

ABSTRACTS

RELATING TO FATS AND ALLIED SUBSTANCES.

BY R. W. MOORE.

Determination of Glycerol Produced by the Saponification of Fatty Oils. A. H. ALLEN.

Ten grams of the oil are treated with 4 grams KOH in 25 c.c. of water in a bottle securely closed with a rubber stopper and heated on the water-bath until saponified. The soap is decomposed and the glycerol determined in half the liquid by Benedekt's method. (*Analyst*, **11**, *52.*)

New Method for Analysis of Milk. M. A. ADAMS.

Five c.c. of milk are run into a 30 c.c. beaker and absorbed by a tared coil of blotting paper. The amount of milk taken up is then determined by again weighing the beaker. The paper coil, resting dry end downward, is then dried and exhausted in a Soxhlet apparatus. The fat is obtained by driving off the ether and weighing the residue, and the solids not fat by again weighing the coil. The fat in this way is completely extracted, and the solids not fat dry without difficulty. Owing to the more perfect drying, the solids not fat are always lower and the fat somewhat higher. The total is somewhat lower than in other methods. The coils are made of white "demy blotting," $2\frac{1}{2}$ in. wide and 22 in. long. (*Analyst*, **10**, *46.*)

Determination of Milk Sugar in Milk. C. W. STEPHENS.

A six or eight per cent. solution of milk is treated directly with Fehling's solution and the sugar determined either volumetrically or gravimetrically. (*Analyst*, **10**, *32*.)

Determination of Rosin in Soaps and Fats. A. GRITTNER and J. SZILASI.

The method of Gladding is only applicable in the case of soaps when they contain no free fatty acids. In this case the soap is dissolved in 80 % alcohol, neutralized with ammonia and precipitated with calcium nitrate. Stearic and palmitic acids are thrown down as calcium salts, while a part of the oleic acid remains in solution with the rosin. The oleic acid is separated as a silver salt from the rosin by means of ether. (*Chem. Ztg.*, **10**, *325*.)

On the Determination of the Specific Gravity of Butter and Tallow at 100°. WOLCKENHAAR.

The author has tested the butter areometer for determining the specific gravity of butter, and has found that the figures given vary from those given by a Westphal balance. Six experiments on butter with the Westphal balance gave from .901 to .904; with the areometer .867 to .869. The specific gravity of tallow by the balance was .893 to .894; by the areometer .860.

This occasioned a series of experiments by Koenig (*Repert. Anal. Chem.*, **5**, *278*), which show that the data given by the areometer agree with those of a Westphal balance adjusted with water at 15°. (*Repert. anal. Chem.*, **5**, *236*.)

Use of Acetic Acid in Milk Analysis. W. JOHNSTONE.

The author claims that the use of acetic acid does not affect the accuracy of the analysis. Milk sugar is not decomposed by prolonged heating at 100° or for 30 minutes at 108°. The fat at first increases, but subsequently decreases in weight, due to loss of insoluble acids. (*Analyst*, **11**, *32*.)

Oxidation of Pure Myristic Acid with Nitric Acid. H. NORDLINGER.

The acid was heated in a retort with nitric acid (Sp. gr. 1. 3)

until the mass became homogeneous and no more red vapors were given off. The products of oxidation were adipic, succinic, suberic and oxalic acids; also glutamic, pimetic and carbonic acids. (*Ber.*, **19,** *1893.*)

Preparation of Soap. F. Eichbaum.

To prepare a curd soap from strongly smelling fish fats, 400 kilos of the fat are warmed with 25 kilos crude palm oil and 250 kilos of 12° lye. The whole is then boiled carefully with more 15° lye until clear and 20° lye is added. 50 kilos of rosin are then added and 40 kilos of 20° lye, and the whole is boiled until combination is complete, when the soap is salted out. The dark under-lye is drawn off, and some clear under-lye from curd soap added. The whole is then boiled again until free from foam. (*Seifenfabrikant, 1886, 104.*)

Purification of Mineral Oil with Sulphurous Acid. Fahlbaum.

The oil is gently distilled with anhydrous sulphurous acid, whereby the color is destroyed and the sulphur compounds decomposed with liberation of H_2S. (*Ding. Pol. Jour.*, **261,** 447.)

Action of Potash on Resin. E. J. Mills.

The resin is treated with an excess of standard alcoholic potash, well shaken and allowed to stand for eighteen hours, when the excess of potash is titrated back with hydrochloric acid, using phenol phthalein as an indicator. The author gives a number of figures on different resins. (*Jour. Soc. Chem. Ind.*, **5,** *221.*)

Cottonseed Oil. James Longmore.

This paper describes a new process for refining the crude oil, which is claimed to be more economical. (*Jour. Soc. Chem. Ind.*, **5,** *200.*)

Abstracts of American Patents Relating to Chemistry.

From the Official Bulletin of the U. S. Patent Office.

July 20th, 1886.

345,714.—Composition for the manufacture of soap. W. J. Menzies.

Consists of granulated potassium-sodium hydroxide.

345,715.—Manufacture of soap by the cold process. W. J. Menzies.

345,753.—Process of photographic printing. R. B. West.

The paper is prepared with potassium bichromate and mercuric chloride. The print is then treated with a bath composed of gallic acid, pyrogallol, ferrous sulphate, sodium hyposulphite, ammonia alum and potassium bitartrate. After this the print is subjected to a bath composed of bromine, potassium bromide and water. Finally it is subjected to the action of a bath consisting of potassium nitrate and lead nitrate.

345,805.—Process for the manufacture of terro-metallic paving stones, etc. L. Promoli.

Brick powder or sand is added to clay and formed into bricks, which are burnt.

345,810.—Manufacture of sugar. F. Schwengers.

Molasses or sugar syrups are dissolved in methyl alcohol or in a mixture of ethyl and methyl alcohol, and the salts of the molasses are separated by the addition of an alcoholic solution of oxalic acid.

345,827.—Process of tanning hides. J. S. Billwiller.

The prepared hides are first treated with a solution of aluminium sulphate, then with a solution of sodium bicarbonate, and finally with tannic acid.

345,847.—Composition for plastering, filling, wall ornaments, etc. W. Horstmann.

Consists of whiting, water, dextrin, boiled linseed oil, and a drier.

345,872.—Method of bleaching animal fats and oils. W. B. Allbright.

Oils are treated at ordinary temperatures with fullers' earth.

345,901.—Naphthol-black color compound. M. Hoffman and A. Weinberg.

345,926.—Method of preparing starch from grain. J. C. Schuman.

345,927.—Method of preparing starch from grain. J. C. Schuman.

345,938.—Process of photographic printing. R. B. West.

Paper is sensitized with potassium bichromate and mercuric chloride. The print is developed with a solution containing pyrogallol, gallic acid, a soluble ferrous salt and sodium hyposulphite, and then bleached with a solution of calcium hypochlorite and phosphoric acid. Finally it is toned with a solution of lead nitrite and mercuric chloride.

345,968.—Retort for calcining bone black. A. C. Harrison.

345,980.—Process of treating natural gas, to convert it into illuminating gas. J. McKay.

346,022.—Sulphonated purple dye-stuff from benzyldiphenylamine. H. Bull.

The condensation product of tetramethyldiamidobenzophenone and benzyldiphenylamine.

346,024.—Fertilizer. H. H. Colquitt.

Consists of the raw kernels of cottonseed combined with phosphorite rock or calcium phosphate. W. R.

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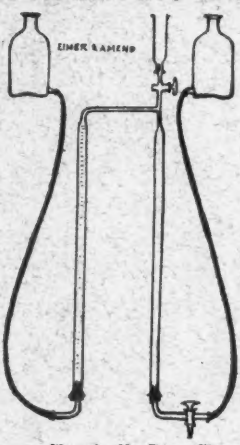

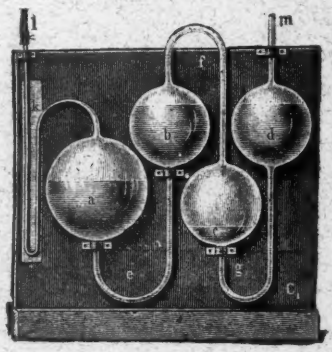

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